IN THE CLAIMS

This listing of claims replaces all prior listings and versions of the claims in the present application.

Listing of Claims:

Claim 1 (Currently Amended): An interface detection apparatus for detecting the position of a hidden interface between first and second materials, the first material having a different physical property from the second material, comprising:

an irradiation mechanism configured to irradiate an electromagnetic wave onto a sample ~~implemented by~~ wherein the sample comprises the first and second materials, and wherein the irradiation mechanism comprises:

an oscillator configured to generate the electromagnetic wave; and

a radiation antenna electrically connected to the oscillator, configured to radiate the electromagnetic wave onto the sample;

a detection mechanism configured to detect the electromagnetic wave that has passed through the sample, [[and]]

a traveling mechanism configured to change the relative position of the hidden interface with respect to the position of the detection mechanism; and

an entrance aperture plate disposed between the radiation antenna and the oscillator, wherein the entrance aperture plate is provided with an entrance aperture configured to pass through a part of the electromagnetic wave.

Claim 2 (Original): The interface detection apparatus of claim 1, wherein the distance between the irradiation mechanism and the detection mechanism is less than 15 times the wavelength of the electromagnetic wave.

Claim 3 (Canceled).

Claim 4 (Original): The interface detection apparatus of claim 1, wherein the irradiation mechanism comprises:

a detection antenna configured to receive the electromagnetic wave; and

a detector electrically connected to the detection antenna, configured to detect information relating to the interface carried by the electromagnetic wave.

Claim 5 (Currently Amended): The interface detection apparatus of claim [[3]] 1, wherein the radiation antenna comprises a horn antenna or a loop antenna.

Claim 6 (Original): The interface detection apparatus of claim 4, wherein the detection antenna comprises a loop antenna.

Claim 7 (Original): The interface detection apparatus of claim 6, wherein the circumference length of the loop antenna is smaller than the wavelength of the electromagnetic wave.

Claim 8 (Canceled).

Claim 9 (Original): The interface detection apparatus of claim 4, further comprising an exit aperture plate disposed between the sample and the detection antenna, the exit aperture plate is provided with an exit aperture configured to pass through a part of the electromagnetic wave.

Claim 10 (Original): The interface detection apparatus of claim 4, further comprising an exit aperture plate disposed between the sample and the detection antenna, the exit aperture plate is provided with a plurality of exit apertures, each of the exit apertures are configured to pass through a part of the electromagnetic wave.

Claim 11 (Currently Amended): The interface detection apparatus of claim [[3]] 1, further comprising a transmitter side cable connecting the radiation antenna to the oscillator.

Claim 12 (Original): The interface detection apparatus of claim 4, further comprising a detector side cable connecting the receiving antenna to the detector.

Claim 13 (Original): The interface detection apparatus of claim 11, further comprising a first anti-reflection plate disposed between the oscillator and the radiation antenna, having an aperture for passing the transmitter side cable.

Claim 14 (Original): The interface detection apparatus of claim 12, further comprising a second anti-reflection plate disposed between the receiving antenna and the detector, having an aperture for passing through the receiving transmitter side cable.

Claim 15 (Original): The interface detection apparatus of claim 12, further comprising a cylindrical anti-reflection plate enclosing the sample, having an entrance aperture for penetrating a transmitter side cable so as to connect the oscillator to the radiation antenna, and an exit aperture for penetrating a detector side cable so as to connect the detection antenna to the detector.

Claim 16 (Original): The interface detection apparatus of claim 1, further comprising a data processor electrically connected to the detector, configured to accept output signals from the detector, to execute a process along with a program based upon the accepted data to define an absolute position of the hidden interface with respect to a reference position.

Claim 17 (Original): The interface detection apparatus of claim 16, wherein the data processor records a relationship between transmitted powers of the electromagnetic wave and relative positions of the detection mechanism.

Claim 18 (Currently Amended): An interface detection method for detecting a position of a hidden interface between first and second materials, the first material having a different physical property from the second material, comprising:

irradiating an electromagnetic wave onto a sample ~~implemented by~~, through an entrance aperture plate disposed between a radiation antenna and an oscillator configured to irradiate the electromagnetic wave so that a part of the electromagnetic wave can pass through the entrance aperture plate, wherein the sample comprises the first and second materials;

detecting the electromagnetic wave that has passed through the sample by a detection mechanism;

changing relative positions of the hidden interface with respect to a position of the detection mechanism; and

determining an absolute position of the hidden interface with respect to a reference position.

Claim 19 (Original): The interface detection method of claim 18, further comprising:

obtaining a specific transmitted power level as a reference power level or a specific phase of transmitted electromagnetic wave as a reference phase by using a reference sample, after irradiating with the electromagnetic wave on to a known interface of the reference sample; and

storing the reference power level or the reference phase in a memory of a data processor,

wherein the absolute position of the hidden interface is determined by comparing the measured transmitted power level with the reference power level, or by comparing the measured phase of transmitted power level with the reference phase.

Claim 20 (Canceled).